REMARKS/ARGUMENTS

Claims 1-21 were pending and examined. The Examiner rejected claims 1-5 and 10-14 under 35 USC § 102(b) as anticipated by Tzelnic (USPN 6,061,504). The Examiner rejected claims 6-9 and 15-21 under 35 USC § 103(a) as unpatentable over Tzelnic in view of Henson (USPN 5,465,343) and further in view of Nobuhiro (JP357125452A).[1] In this response, Applicant has amended the specification, amended claims 1-4, 10, 11, and 18-21, and added new claims 25-27. Claims 1-21 and 25-27 are now pending.

Specification amendments

Applicant has amended the specification as indicated above to correct grammatical / typographical errors and omissions. These amendments are intended only to clarify the disclosure, are not intended to alter the scope of the invention, and are not submitted for any purpose related to patentability.

Claims rejections under 35 USC § 102(b)

The Examiner rejected independent claim 1 under 35 USC § 102(b) as anticipated by Tzelnic. In response to this rejection, Applicant has amended independent claim 1 to recite that the claimed method includes determining the network transfer rate (i.e., data rate) of a variable network transfer rate connection between a client and a web server. In addition, claim 1 as amended recites that determining when to retrieve and transmit subsequent portions of the requested data is based on the determined data rates. Support for these amendments is found in the specification at page 1, lines 17-21, page 3, lines 19-31, and at page 8, lines 2-12. The amendment also eliminates the previously presented claim language explicitly distinguishing between first and second network connections. Claim 3 is amended to recite a limitation in which the network transfer rate is determined after each request. Claim 4 has been amended to correct an antecedent basis issue.

The cited reference fails to disclose or suggest the limitations of claim 1 as amended herein because Tzelnic does not teach or suggest determining the network transfer rates of

variable network transfer rate connections between a server and a client. Before addressing the rejections specifically, a summary of the reference is presented and contrasted with the present invention.

Tzelnic is a video file server invention that discloses a system for delivering video streams in real-time to multiple clients via an ATM network. Tzelnic indicates that real-time video applications and other isochronous applications "must be delivered at a constant data rate."[2] To support isochronous applications, Tzelnic teaches the use of an ATM switch (53) located between the client systems (54) and the video servers (21). The ATM switch (53) as well as the video streaming application addressed by Tzelnic are very clear indicators that the client/server connections described are not TCP/IP connections and that the server (20) is not a web server. As is well known, web servers are generally configured to handle HTTP requests over TCP/IP-compliant networks such as the Internet. The bandwidth available to, and thus the data rate of, any particular client-server connection in this environment depends on factors such as the amount of network traffic, routing, etc., such that the precise data rate of any particular TCP/IP connection is unpredictable and heavily dependent on instantaneous network characteristics. In contrast, the ATM network disclosed in Tzelnic, consistent with the desire to deliver real-time video data, is designed to provide a guaranteed level of service (i.e., bandwidth) to an application.

With respect to the Section 102(b) rejection of claim 1, an anticipation rejection is appropriate only when all claim limitations are found in the cited reference. Nowhere in Tzelnic is there any teaching to determine the data rate of a variable network transfer rate connection (as recited in claim 1) such as a TCP/IP connection (recited in claim 2) between a client and a server. Applicant submits that, when interpreted in light of the specification, "variable network transfer rate" conveys the concept that the variability of the network transfer rate is inherent in the architecture of the network and beyond the control of the client or server. The client server connections of Tzelnic have network transfer rates suitable for supporting constant bit rate applications and, as such, are not suggestive of a variable network transfer rate connection such as a TCP/IP connection. With respect to claim 2, for example, Tzelnic does not disclose or

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[1] The Examiner initially indicated that the Office Action was final, but withdrew the finality after reconsideration.
[2] Tzelnic, column 1, lines 46-52.

suggest determining the data rates of a TCP/IP connection. In fact, Tzelnic refers to TCP only once (column 8, line 60), to describe a possible protocol stack between the video server's network link drivers (72) and its file access protocols (75). There is nothing in this passing reference to TCP/IP that teaches (or suggests any utility of) determining the data rate of a TCP/IP connection between a server and a client as recited in amended claim 2 and, more generally, nothing teaching or suggesting determining the data rate of any variable network transfer rate connection as recited in claim 1.

In addition, Tzelnic does not disclose using the data rate of a variable network transfer rate connection to schedule retrieval of data from disk storage. The Examiner states that Tzelnic teaches "to determine and resolve the difference of network transfer rate (sic) for a set of clients/servers on the TCP network connection." Although the Examiner cites a number of excerpts from Tzelnic to support this assertion, the primary support seems to come from Tzelnic's description of "prefetching" data from the disk to the disk cache and "fetching" data from disk cache to a stream server found in columns 19 and 20. Although Tzelnic does describe prefetching data from a disk and timing the prefetching based on the transmission time to minimize the amount of disk cache space required, this method is described only in conjunction with the provision of multiple, isochronous video streams. Applicant would respectfully submit that, because isochronous data streams are inconsistent with the variable network transfer rate and TCP/IP limitations of the claims 1 and 2, Tzelnic does not anticipate the claims.

Moreover, with respect to Section 103(a), Applicant would further submit that Tzelnic does not suggest or provide motivation for the limitations of the amended claims because it would not be obvious to modify Tzelnic's prefetching concept to a variable network transfer rate connection. Specifically, modifying the isochronous data streams of Tzelnic to comply with a TCP/IP protocol stack or any other variable network transfer rate connection type would render Tzelnic unfit for its intended purpose, which is the provision of real time video. Real time video requires isochronous bits streams to minimize jitter and other undesirable effects. These effects are exacerbated in variable network transfer rate or "bursty" networks such as conventional TCP/IP networks and, therefore, one skilled in the field would not attempt to implement the video streaming and prefetching techniques of Tzelnic using a variable network transfer rate connection.

Tzelnic is antithetical to the concept of determining the bit rate of a variable network transfer rate connection and then using that determined bit rate to schedule the retrieval of portions of a requested file from disk because the client/server connections disclosed by Tzelnic are intended for real-time and constant bit rate applications. The foundation of the present invention is that, because web-based and other types of network requests and responses travel over notoriously unpredictable mediums such as the Internet, there is utility in making an empirical measure of the medium's data rate and using the determined data rate to schedule (and thereby optimize) server activity. Whereas the prefetch scheduling described by Tzelnic is intuitive in the context of constant bit rate applications, the limitations of amended claim 1 recognize that data rate in conventional web-based communications, although thoroughly unpredictable and dynamic, can still be useful in scheduling disk tasks.

Claim 3 has been amended to emphasize the dynamic nature of the variable network transfer rate connection's data rate, which is in contrast to the constant and relatively static data rate of the Tzelnic client/server connections. Specifically, claim 3 as amended herein recites that the data rate is determined responsive to each new data request. Support for this amendment is found in FIG 4 element 408 and the accompanying text at paragraph beginning on page 7, line 24. Claim 3 as amended recites a limitation that is not taught or suggested by Tzelnic. The Tzelnic data rates are disclosed as being substantially static. For example, Tzelnic discloses that the network transmission rate is approximately 150 GB/hour. This static value is entirely consistent with the delivery of isochronous applications over a network with a guaranteed level of service. In such cases, however, there is no motivation to determine the bit rate each time a file request is serviced because doing so in the context of a relatively invariant network consumes resources without adding any benefit.

Independent claim 10 has been amended to recite limitations that are substantially analogous to the limitations found in amended claim 1 except that, in addition, claim 10 recites wherein the variable network transfer rate connection is an Internet connection. In the same way that the requirements of the isochronous applications of Tzelnic are incompatible with variable network transfer rate connections, Applicant would submit that those requirements are also incompatible with the Internet connection recited in amended claim 10. The Internet, as is well known, is characterized by unpredictable bandwidth and data rates and the recital of an Internet

connection in claim 10 further distinguishes the claimed matter from the reference.[3] Thus, Applicant would submit that amended claim 10 is neither anticipated nor suggested by the cited reference.

With respect to independent claim 18, the claim has been amended to incorporate both the variable network transfer rate limitations of claim 1 and the Internet limitations of claim 10. In addition, Applicant has recited that the server is a web server. The web server limitation further distinguishes the claimed invention from the reference because it is clear that the video server 20 of Tzelnic and the supporting servers are not web servers and that the video applications addressed by Tzelnic are not suggestive of a web server. A web server will be understood to refer to a server designed to service web requests (i.e., HTTP requests). Applicant has also moved the limitations regarding placement of the disk head back into (new) dependent claims following the Examiner's withdrawal of the allowability of claim 18 as presented in the previous office action. For reasons analogous to those cited in support of claims 1 and 18, Applicant believes that independent claim 18 recites mater that is not anticipated by the cited reference.

Claim rejections under 35 USC § 103(a)

The Examiner rejected claims 6-9 and 15-21 under 35 USC § 103(a) as unpatentable over Tzelnic in view of Henson (USPN 5,465,343) and further in view of Nobuhiro (JP357125452A). In response to this rejection, as indicated above, Applicant has extracted the limitations regarding disk head positioning previously presented in claim 18 and inserted the limitations into new claims 25, 26, and 27 respectively.[4]

Regarding previously presented claims 6-9, 14-17, and 21, and new claims 25, 26, and 27, Applicant respectfully traverses the rejection that the Section 103(a) rejection based on the combination of Tzelnic, Henson, and Nobuhiro because the references fail to teach or suggest all of the claimed limitations. The Office Action acknowledges that Tzelnic and Henson do not disclose the limitations regarding monitoring of disk head position and prioritizing request handling based on the physical proximity of the data associated with each request. To support

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[3] The ATM-based client-server network of Tzelnic is clearly not the Internet.

the Section 103(a) rejection, the Office Action states that the abstract of Nobuhiro expressly discloses a data storage system that retrieves data associated with a subsequent request if the data is closer to the current head position than the data associated with the subsequent portion of the first file request. The portion of the Nobuhiro relied upon by the Examiner reads as follows:

> To minimize a wasteful use of a disc space to shorten the latency time, by reading or writing data from or into a sector neatest to the current head position when a readout or write instruction does not designate a sector address.

In contrast, claim 7 (and, by analogy, claims 16 and 26), reads:

> determining the disk location of the subsequent portion of data associated with the first request and determining the disk location of a portion of data associated with a second file request.

Applicant would respectfully submit that Nubihiro simply does not contain or suggest limitations in which a system determines the physical locations of two different pieces of data on disk. Nubihiro merely teaches that, when data has no required storage device address or location, it makes sense to store the data close to the current position of the head. This disclosure does not describe any comparison of the physical proximity of data associated with two different data request let alone, using physical proximity information to prioritize handling of various requests as recited in claims 8, 9, 17, and 27. As such Applicant would respectfully submit that the cited references fails to disclose or suggest all of the limitations of the claims under consideration.
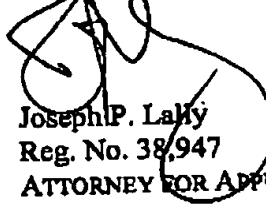
In the present response, Applicant has responded to the Examiner's claim rejections under 35 USC §§ 102(b) and 103(a). Accordingly, Applicant believes that this response constitutes a complete response to each of the issues raised in the office action. In light of the amendments made herein and the accompanying remarks, Applicant believes that the pending claims are in condition for allowance. Accordingly, Applicant would request the Examiner to withdraw the rejections, allow the pending claims, and advance the application to issue. If the Examiner has

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[4] Because the new claims 25-27 incorporate the disk head limitations of previously presented claim 18, this response will treat new claims 25-27 as if they had been rejected under the same rationale applied to claim 18.

any questions, comments, or suggestions, the undersigned attorney would welcome and encourage a telephone conference at 512.428.9872.

Respectfully submitted,

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